Advanced Reciprocating Engine Systems

FY-2003

PEER REVIEW

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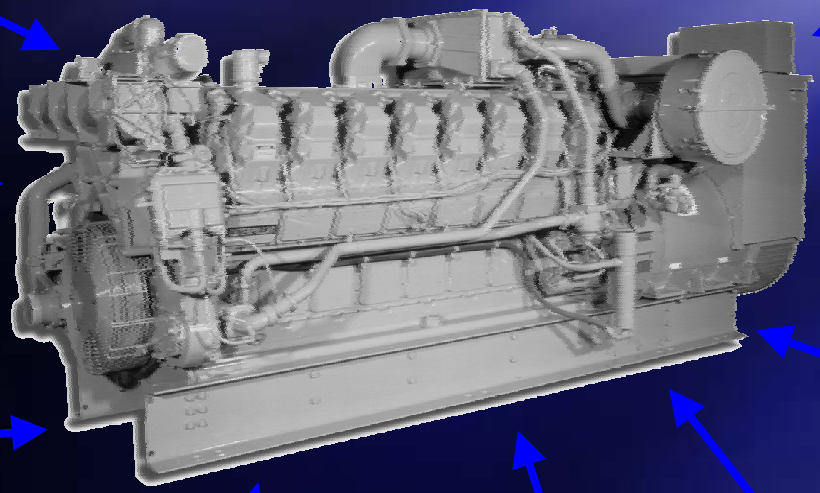
ARES Technologies



- Combustion Chamber Design
- Combustion of Dilute Mixtures
- Selective Catalytic Reduction
- Exhaust Aftertreatment LNC, TWC
- Water Injection
- High Power Density
- Multiple Source Ignition
- Exhaust Energy Retention
- Turbo-compounding
- Friction Reduction

The ARES Program Mission

To develop a Class of Internal Combustions Engines that:

- have higher efficiency,
- meet stringent requirements for NOx, and other environmental pollutants whether using natural gas, propane, bio-fuels, and
- to make the engines available at a competitive price.

ARES Program Natural Gas

- Project Goals: Near Term 2005

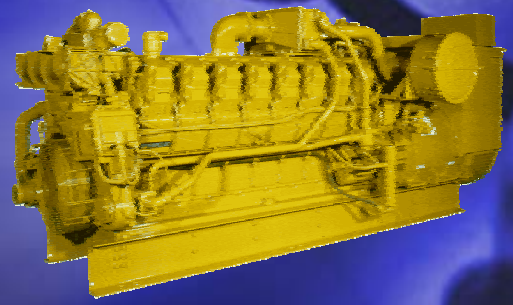
– Engine Efficiency	42%
– NOx Emissions	0.1 gm/bhphr
– Cost Reduction	10%

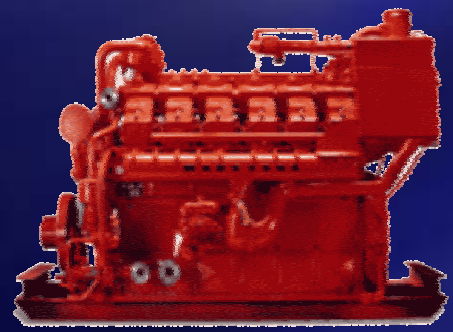
Issues to be addressed

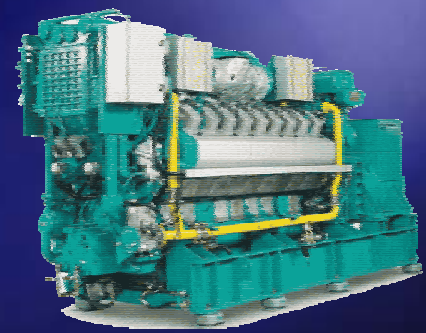
- Ignitions Systems
  - Timing
  - Durability
  - Reliability
  - Controls
  - Spark Plugs
  - Materials
- Emissions
  - Lean Burn
  - Rich Burn
  - Catalysts
  - After-treatment
  - Before-Treatment
  - Fuels

ARES Goal

2000: Natural gas engines
30% efficient and moderate
NOx emissions



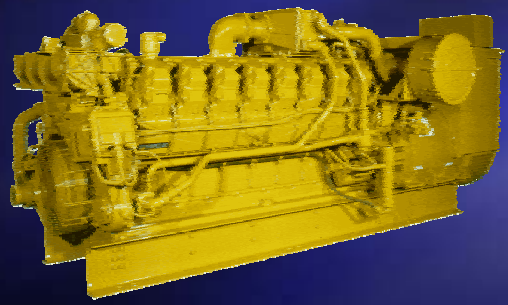




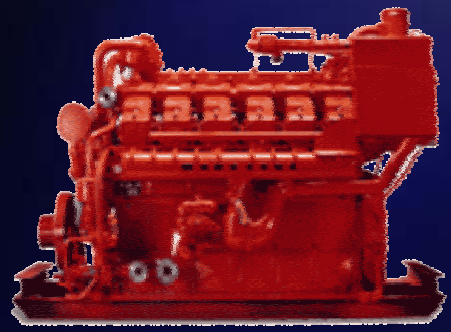
2010: Advanced reciprocating
engine system "ARES" ~
50% efficient equipment (LHV)
& .1 gm/bhp-hr NOx emissions

Major Manufacturers

- Caterpillar



- Waukasha



- Cummins

National Laboratories

- Argonne National Laboratory
- Oak Ridge National Laboratory
- Sandia National Laboratory
- Lawrence Berkley National Laboratory
- Brookhaven National Laboratory
- Pacific Northwest National Laboratory

University Program

- Colorado State University (2)
- Massachusetts Institute of Technology
- Michigan Technological Institute
- Purdue University
- University of Southern California
- University of Texas at Austin (2)
- West Virginia University
- University of Tennessee
- Ohio State University
- University of Michigan
- University Of Maryland

Roundtable Discussion

Designed to bring together invited experts in the various technologies pertaining to the ARES engine program and associated research.

Workshop Objectives

- Introduce researchers to contacts engine companies
- Start dialog between universities and engine manufacturers on needs and capabilities
- Identify technology areas for collaborative or joint efforts
- Define mechanisms and structure of collaborative efforts in terms of funding and interaction
- Allow universities to refine model for program analysis
- Participate in an informal discussion to comment on program model
- Develop a Co-op Program with Universities and Manufacturers

Other Professional Organizations

- Southwest Research Institute
- TIAX
- Energetics

ARES Program

Thank You

Ronald Fiskum